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Optical near-field scattering in a tip-sample system: A Green's function approach

Rogov A., Gazizov A., Kharintsev S., Salakhov M.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The optical near-field contribution to the total scattered intensity for a spherical metallic nanoparticle close to a dielectric planar interface is analytically calculated using a Green's function formalism. This system is suited for probing a specimen of interest on a dielectric substarte with a taper optical metallic nanoantenna. Based on the effective polarizability model we find a Green's function in the dipolar approximation, that allows one take into account the presence of the dielectric substrate. In particular, we provide evidence that the latter noticably influences the near-field contribution and it should necessarily be included in the generalized formalism for calculating the Green's functions for Raman scattering and fluorescence. A comparative analysis of the analytical model and finite-difference time domain based numerical simulation is performed.

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